Phase 6 Nutrient Management Expert Panel

Name	**Affiliation**
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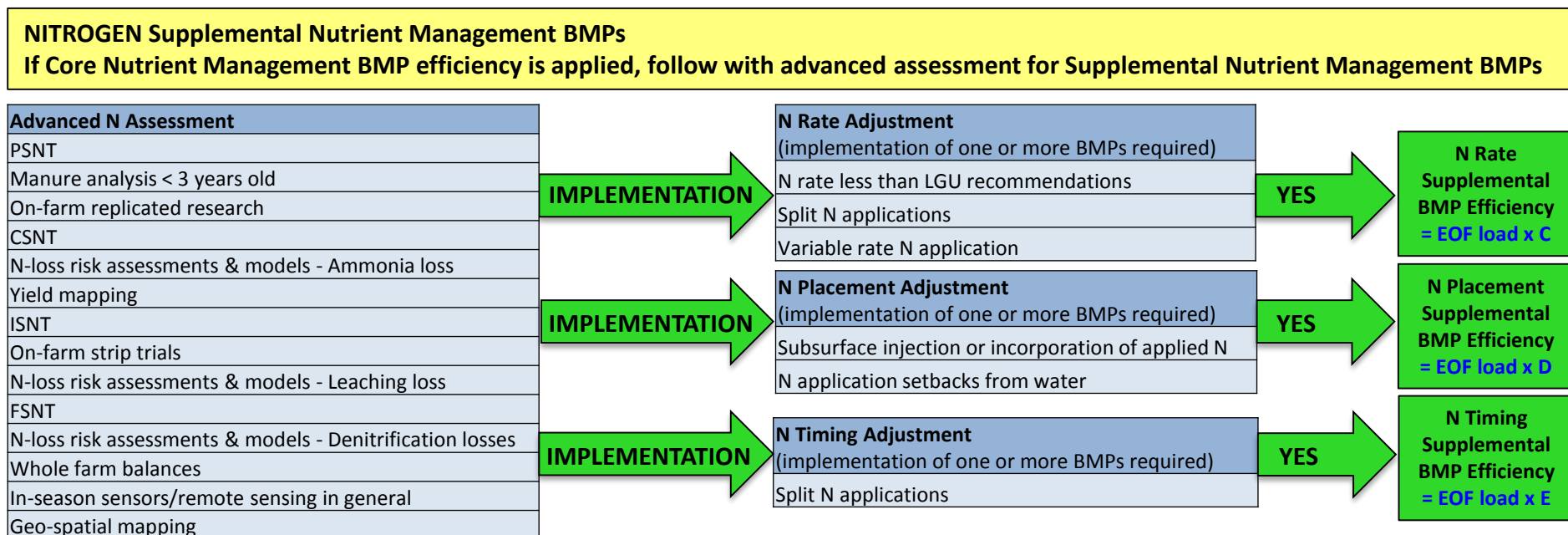Agriculture Workgroup Coordinator
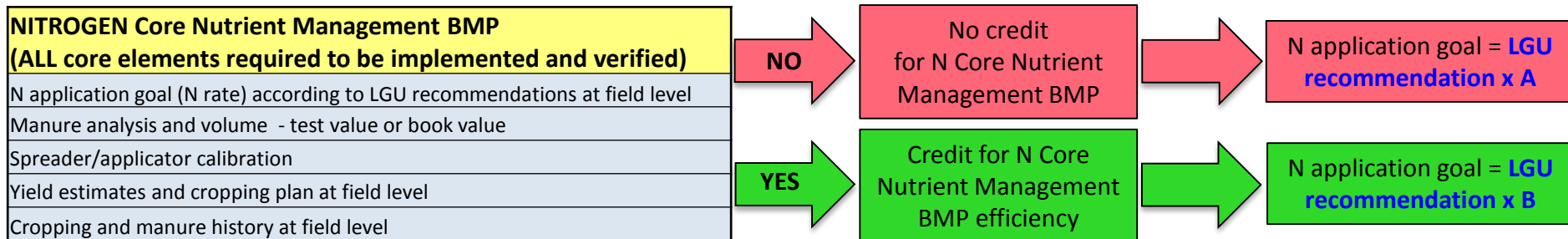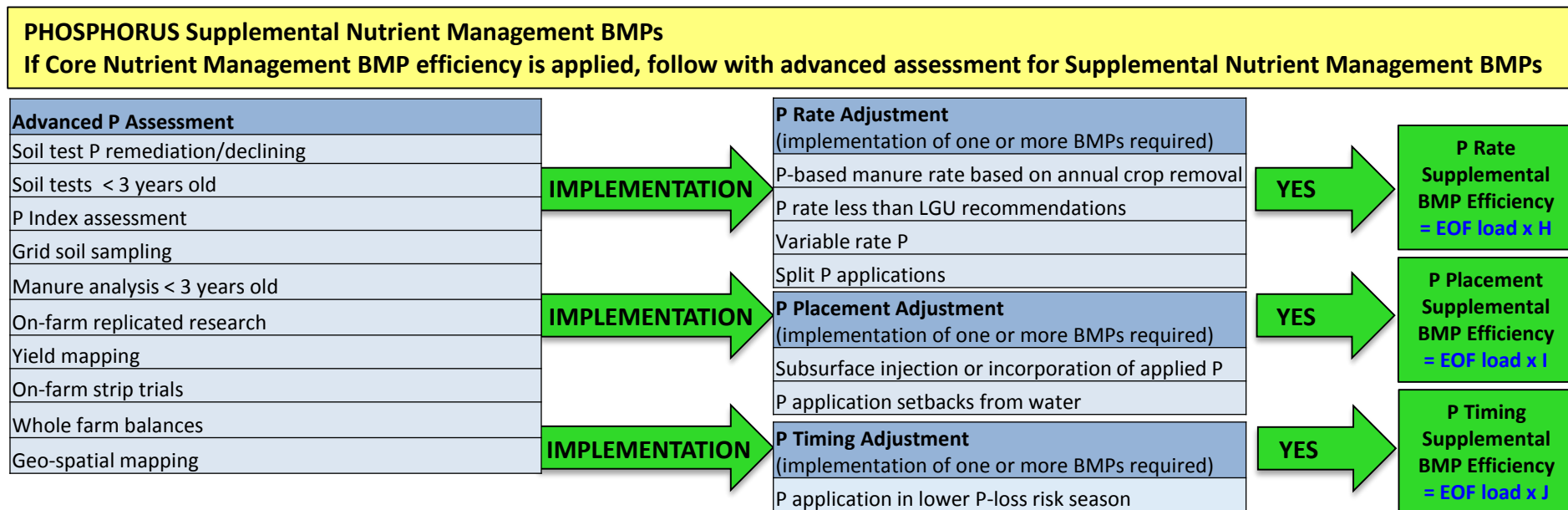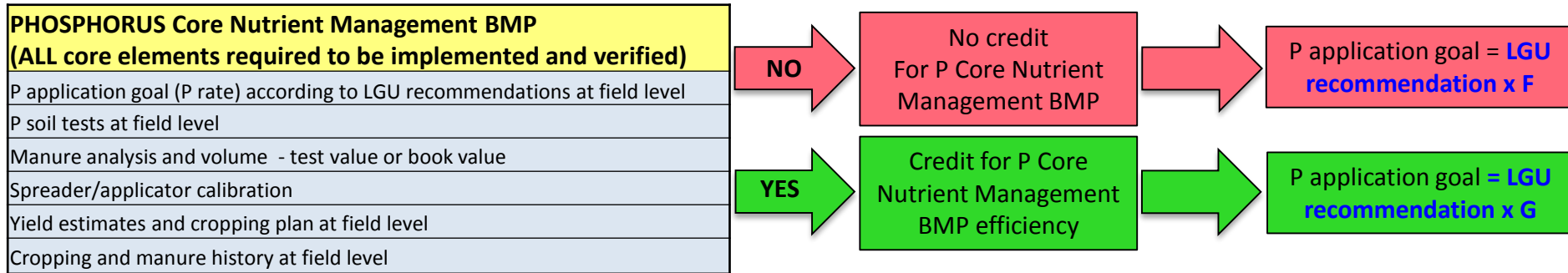Mark Dubin   University of Maryland, CBPO

Phase 6 Nutrient Management Expert Panel
Guiding Principles

1. Nitrogen (N) and phosphorus (P) assessments are handled similarly but separately.

2. Historical base-line conditions (i.e.1985) are used as a uniform reference point for pre-BMP, non-nutrient management conditions.

3. Core Nutrient Management BMP efficiency factors for N and P are based on state LGU recommendations, as modified by CBP state partners, and represent land-use and cropping system specific N and P application rates.

4. Core Nutrient Management BMP efficiency factors for N and P modify the nutrient application rate goals.

5. Supplemental Nutrient Management BMP efficiencies for rate, timing and placement of N and P are additive to the Core Nutrient Management BMP efficiencies for N and P, but can not be applied without application of the Core BMPs.

6. Supplemental Nutrient Management BMP efficiency factors modify the edge of field nutrient loss to the receiving stream.

7. All BMP efficiency values for N and P are numeric variables that have been define by the Nutrient Management Expert Panel.

8. County-level redistribution of CBW N fertilizer sales data should be used as an independent cross-reference for and validation of the modified LGU recommendation based N application rate goals.

9. LGU recommendations for P application are based on soil-test P concentration. Soil P concentration data are not available to CBP but should be collected and utilized in the future. In the absence soil-test P based application rate goals, county-level redistribution of CBW P fertilizer sales data may serve as a surrogate.

Nitrogen Nutrient Management BMP Efficiency Factors

NITROGEN Core Nutrient Management BMP **(ALL core elements required to be implemented and verified)**
N application goal (N rate) according to LGU recommendations at field level
Manure analysis and volume - test value or book value
Spreader/applicator calibration
Yield estimates and cropping plan at field level
Cropping and manure history at field level

NO → No credit for N Core Nutrient Management BMP → N application goal = **LGU recommendation x A**

YES → Credit for N Core Nutrient Management BMP efficiency → N application goal = **LGU recommendation x B**

NITROGEN Supplemental Nutrient Management BMPs **If Core Nutrient Management BMP efficiency is applied, follow with advanced assessment for Supplemental Nutrient Management BMPs**

Advanced N Assessment
PSNT
Manure analysis < 3 years old
On-farm replicated research
CSNT
N-loss risk assessments & models - Ammonia loss
Yield mapping
ISNT
On-farm strip trials
N-loss risk assessments & models - Leaching loss
FSNT
N-loss risk assessments & models - Denitrification losses
Whole farm balances
In-season sensors/remote sensing in general
Geo-spatial mapping

IMPLEMENTATION →

N Rate Adjustment **(implementation of one or more BMPs required)**
N rate less than LGU recommendations
Split N applications
Variable rate N application

YES → **N Rate Supplemental BMP Efficiency = EOF load x C**

IMPLEMENTATION →

N Placement Adjustment **(implementation of one or more BMPs required)**
Subsurface injection or incorporation of applied N
N application setbacks from water

YES → **N Placement Supplemental BMP Efficiency = EOF load x D**

IMPLEMENTATION →

N Timing Adjustment **(implementation of one or more BMPs required)**
Split N applications

YES → **N Timing Supplemental BMP Efficiency = EOF load x E**

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Phosphorus Nutrient Management BMP Efficiency Factors

PHOSPHORUS Core Nutrient Management BMP
(ALL core elements required to be implemented and verified)

P application goal (P rate) according to LGU recommendations at field level
P soil tests at field level
Manure analysis and volume - test value or book value
Spreader/applicator calibration
Yield estimates and cropping plan at field level
Cropping and manure history at field level

NO → No credit For P Core Nutrient Management BMP → P application goal = **LGU recommendation x F**

YES → Credit for P Core Nutrient Management BMP efficiency → P application goal = **LGU recommendation x G**

PHOSPHORUS Supplemental Nutrient Management BMPs
If Core Nutrient Management BMP efficiency is applied, follow with advanced assessment for Supplemental Nutrient Management BMPs

Advanced P Assessment
Soil test P remediation/declining
Soil tests < 3 years old
P Index assessment
Grid soil sampling
Manure analysis < 3 years old
On-farm replicated research
Yield mapping
On-farm strip trials
Whole farm balances
Geo-spatial mapping

IMPLEMENTATION →

P Rate Adjustment (implementation of one or more BMPs required)
P-based manure rate based on annual crop removal
P rate less than LGU recommendations
Variable rate P
Split P applications

YES → **P Rate Supplemental BMP Efficiency = EOF load x H**

IMPLEMENTATION →

P Placement Adjustment (implementation of one or more BMPs required)
Subsurface injection or incorporation of applied P
P application setbacks from water

YES → **P Placement Supplemental BMP Efficiency = EOF load x I**

IMPLEMENTATION →

P Timing Adjustment (implementation of one or more BMPs required)
P application in lower P-loss risk season

YES → **P Timing Supplemental BMP Efficiency = EOF load x J**

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Nutrient Management BMP	BMP Efficiency Variable	Action of BMP	How the math works
Nutrient Management BMP Efficiency Values – draft version #4, 07-19-2016			
Nitrogen Core **Non-Nutrient Management** BMP efficiency	A	modifies N application rate goal on the nutrient input side	efficiency is multiplied by the LGU N application rate goal
Nitrogen Core **Nutrient Management** BMP efficiency	B	modifies N application rate goal on the nutrient input side	efficiency is multiplied by the LGU N application rate goal
Nitrogen Rate Supplemental BMP efficiency	C	modifies edge of field N loss to the stream on the outflow side	efficiency is multiplied by the calculated edge of field N load
Nitrogen Placement Supplemental BMP efficiency	D	modifies edge of field N loss to the stream on the outflow side	efficiency is multiplied by the calculated edge of field N load
Nitrogen Timing Supplemental BMP efficiency	E	modifies edge of field N loss to the stream on the outflow side	efficiency is multiplied by the calculated edge of field N load
Phosphorus Core **Non-Nutrient Management** BMP efficiency	F	modifies P application rate goal on the nutrient input side	efficiency is multiplied by the LGU P application rate goal
Phosphorus Core **Nutrient Management** BMP efficiency	G	modifies P application rate goal on the nutrient input side	efficiency is multiplied by the LGU P application rate goal
Phosphorus Rate Supplemental BMP efficiency	H	modifies edge of field P loss to the stream on the outflow side	efficiency is multiplied by the calculated edge of field P load
Phosphorus Placement Supplemental BMP efficiency	I	modifies edge of field P loss to the stream on the outflow side	efficiency is multiplied by the calculated edge of field P load
Phosphorus Timing Supplemental BMP efficiency	J	modifies edge of field P loss to the stream on the outflow side	efficiency is multiplied by the calculated edge of field P load

Nutrient Management BMP Efficiency Values – draft version #4, 07-19-2016

Nutrient Management BMP	BMP Efficiency Variable	Full Season Soybeans	Grain w/ Manure	Grain w/o Manure	Legume Hay	Silage w/ Manure	Silage w/o Manure	Small Grains and Grains	Small Grains and Soybeans	Specialty Crop High	Specialty Crop Low	Other Agronomic Crops	Other Hay	Pasture
Nitrogen Core **Non-Nutrient Management** BMP efficiency	A	1.20	1.30	1.20	1.20	1.40	1.20	1.20	1.20	1.30	1.20	1.10	1.00	1.00
Nitrogen Core **Nutrient Management** BMP efficiency	B	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Nitrogen Rate Supplemental BMP efficiency	C	1.00	0.85	0.95	1.00	0.85	0.95	0.95	0.95	0.85	0.95	0.95	1.00	1.00
Nitrogen Placement Supplemental BMP efficiency	D	1.00	0.95	0.97	1.00	0.95	0.97	0.97	0.97	0.95	0.97	0.97	1.00	1.00
Nitrogen Timing Supplemental BMP efficiency	E	1.00	0.90	0.95	1.00	0.90	0.95	0.90	0.90	0.95	0.95	0.95	1.00	1.00
Phosphorus Core **Non-Nutrient Management** BMP efficiency	F	1.50	3.00	1.50	1.00	3.00	1.50	1.50	1.50	2.00	2.00	1.50	1.00	1.00
Phosphorus Core **Nutrient Management** BMP efficiency	G	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Phosphorus Rate Supplemental BMP efficiency	H	0.95	0.90	0.95	0.99	0.90	0.95	0.95	0.95	0.95	0.95	0.95	1.00	1.00
Phosphorus Placement Supplemental BMP efficiency	I	0.90	0.80	0.90	0.90	0.80	0.90	0.90	0.90	0.90	0.90	0.90	1.00	1.00
Phosphorus Timing Supplemental BMP efficiency	J	0.99	0.80	0.99	0.99	0.80	0.99	0.99	0.99	0.99	0.99	0.99	1.00	1.00

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